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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/825,618      | 04/16/2004  | Lutz Aschke          | KEKO-0003           | 7871             |

23599 7590 11/03/2006

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EXAMINER

ROSASCO, STEPHEN D

ART UNIT PAPER NUMBER

1756

DATE MAILED: 11/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/825,618

Applicant(s)

ASCHKE ET AL.

Examiner

Stephen Rosasco

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 1008/04, 11/05/04, 12/5/05.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

Detailed Action

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1,2, 10, 11, 12, 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Tong et al. (6,352,803).

Tong et al. teach the use of a back coating for electrostatic chucking and that the coating is the same on the front and back of the substrate (see claims and col.6, lines 15-26) – FIG. 4 illustrates an EUVL mask substrate 40 which comprises a substrate 11, multilayers 12, buffer layer 13, and an absorber pattern 14, as in FIG. 1, but with the addition of a front coating 41 between substrate 11 and multilayers 12, as in FIG. 2, and a back coating 42 on the substrate 11, as in FIG. 3, whereby the front coating 41 enhances defect inspection, balance stress, smooth defects, and/or be repolished, as in FIG. 2; and whereby back coating 42 facilitates electrostatic chucking and/or balance stress, as in FIG. 3. The coatings 41 and 42 may each be composed of materials such as Si, Mo, Cr, chromium oxynitride, TaSi, or Mo/Si multilayers.

Claims 1, 2, 11 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Levinson et al. U.S. Patent (6,984,475) .

Levinson et al. teach (see claims) an EUV lithography mask blank, comprising: a substrate having an upper surface and a lower surface; a reflector film disposed over the upper surface of the substrate; a backside conductive layer disposed on the lower surface of the substrate; and a means to electrically couple the conductive layer and the reflector film.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tong et al. (6,352,803) or Levinson et al. U.S. Patent (6,984,475) in view of Alpay et al. (6,841,309).

The claimed invention (claims 1-10) is directed to a photomask comprising: mask blank for use in EUV lithography comprising a substrate with a front side and a rear side whereby a coating for use as a mask in EUV lithography is applied to the front side, wherein the rear side comprises an electrically conductive coating.

Claims 11-19 are to a method of coating the EUVmask blank.

The applicant discusses the advantages of this structure in that because the rear side of the substrate that has an electrically conductive coating formed by sputtering, the mask blank may be held and handled using an electrostatic holding device. The electrically conductive coating on the rear side of the mask blank enables electrostatic charges from the mask blank, for example during transportation or handling, to be avoided in an even more effective way.

Tong et al. teach the use of a back coating for electrostatic chucking and that the coating is the same on the front and back of the substrate (see claims and col.6, lines 15-26) – FIG. 4 illustrates an EUVL mask substrate 40 which comprises a substrate 11, multilayers 12, buffer layer 13, and an absorber pattern 14, as in FIG. 1, but with the addition of a front coating 41 between substrate 11 and multilayers 12, as in FIG. 2, and a back coating 42 on the substrate 11, as in FIG. 3, whereby the front coating 41 enhances defect inspection, balance stress, smooth defects, and/or be repolished, as in FIG. 2; and whereby back coating 42 facilitates electrostatic chucking and/or balance stress, as in FIG. 3. The coatings 41 and 42 may each be composed of materials such as Si, Mo, Cr, chromium oxynitride, TaSi, or Mo/Si multilayers.

Levinson et al. teach an EUV lithography mask blank, comprising: a substrate having an upper surface and a lower surface; a reflector film disposed over the upper surface of the substrate; a backside conductive layer disposed on the lower surface of the substrate; and a means to electrically couple the conductive layer and the reflector film.

The teachings of Tong et al. or Levinson et al. differ from those of the applicant in that the applicant teaches that the rear side of the substrate that has an electrically conductive coating formed by sputtering with specific abrasion resistance.

Alpay et al. teach a damage resistant photomask, comprising: a photomask pattern including a plurality of features formed on a substrate, the features formed of an optical absorber; and a transparent, protective layer formed on and in contact with the photomask pattern, the transparent, protective coating operable to prevent the features from being damaged by electrostatic discharge.

Alpay et al. also teach (see col. 5, line 52+) - As depicted in FIGS. 4E and 5C, for both binary masks and AAPS masks, after the pattern has been formed, the photomask manufacturer then forms one or more layers of protective coating 120 on the patterned substrate. In the example process, protective coating 120 is a transparent, dielectric material, (e.g., spin-on glass). For binary masks, the protective coating may be composed largely of silicon dioxide ( $\text{SiO}_2$ ). For AAPS masks, it may be preferable to use a coating with a higher refractive index. For instance, in AAPS masks, a protective coating composed of sputter-deposited hafnium oxide ( $\text{HfO}_2$ ) may be used. Hafnium oxide has a refractive index of approximately 2.25 at 248 nm, a wavelength typically used in semiconductor lithography. In alternative embodiments, however, other types of coatings may be used, including, but not limited to, aluminum oxide ( $\text{Al}_2\text{O}_3$ ), aluminum nitride ( $\text{AlN}$ ), silicon nitride ( $\text{Si}_3\text{N}_4$ ), tantalum oxide ( $\text{Ta}_2\text{O}_5$ ), yttrium oxide ( $\text{Y}_2\text{O}_3$ ), magnesium fluoride ( $\text{MgF}_2$ ), magnesium oxide ( $\text{MgO}$ ), zirconium oxide ( $\text{ZrO}_2$ ), lithium fluoride ( $\text{LiF}$ ), aluminum fluoride ( $\text{AlF}_3$ ), calcium fluoride ( $\text{CaF}_2$ ), and indium-tin oxide (i.e., indium oxide doped with tin oxide; also known as "ITO").

It would have been obvious to one having ordinary skill in the art to take the teachings of Tong et al. or Levinson et al. and combine them with the teachings of Alpay et al. in order to make the claimed invention because it is well known in the art of EUV Mask lithography that when layers are added to a substrate they are usually sputtered on to the substrate, and one would expect that layers made the same have similar abrasion and electrical resistance as measure by specific testing.

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*Conclusion*

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'S. Rosasco', is written over a horizontal line.

S. Rosasco  
Primary Examiner  
Art Unit 1756

S. Rosasco  
10/23/06